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Model selection based on value-at-risk backtests approach for GARCH-type models

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This paper aims to investigate the efficiency of the value-at-risk (VaR) backtests in the model selection from different types of generalised autoregressive conditional heteroskedasticity (GARCH) models with skewed and non-skewed innovation distributions. Extensive simulation is carried out to compare the model selection based on VaR backtests and Akaike Information Criteria (AIC). When the model is given but the innovation distribution is one of the six selected distributions which may be skewed or non-skewed, the simulation results show that both AIC and the VaR backtests succeed in selecting the correct innovation distribution from the set of six distributions under consideration. This indicates that both AIC and the VaR backtests are able to distinguish between skewed and non-skewed distributions when the innovation distribution is misspecified. Using an empirical data from NASDAQ index, we observe that the selected combination of model and innovation distribution based on the smallest AIC does not agree with that selected by using the in-sample VaR backtests. Examination of confidence limits for VaR and the expected shortfall forecasts under various loss functions provides evidence that the selected combination of model and innovation distribution using the VaR backtests tends to possess smaller mean absolute percentage error and logarithmic loss.